In-Sight Micro

In-Sight Micro Vision System Installation Manual

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Hardware	4,972,359; 5,526,050; 5,657,403; 5,793,899
Vision Tools	5,495,537; 5,548,326; 5,583,954; 5,602,937; 5,640,200; 5,717,785; 5,742,037; 5,751,853; 5,768,443; 5,796,868; 5,818,443; 5,825,483; 5,825,913; 5,845,007; 5,859,466; 5,872,870; 5,909,504

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Declaration of Conformity	
Manufacturer:	Cognex Corporation One Vision Drive Natick, MA 01760 USA
Declares this CE-marked Machine Vision System Product	
Product Number:	In-Sight Micro 1020/1050: P/N or Type 821-0002-1R In-Sight Micro 1100/1110: P/N or Type 821-0002-1R In-Sight Micro 1400/1410: P/N or Type 821-0002-1R In-Sight Micro 1403/1413: P/N or Type 821-0003-1R
Complies With:	2004/108/EC Electromagnetic Compatibility Directive
Compliance Standards:	EN 55022:2006 Class A EN 61000-6-2:2005
European Representative:	Cognex France Immeuble le Patio 104 avenue Albert 1er 92563 Rueil Malmaison France
Safety and Regulatory	
FCC	FCC Part 15, Class A This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.
NRTL	TUV SUD AM SCC/NRTL OSHA Scheme for UL/CAN 60950-1
CB	TUV SUD AM, IEC/EN 60950-1

Note:	For the most up-to-date regulations and conformity information, please refer to the In-Sight online support site: http://cognexsensors.com/In-Sight.

Observe these precautions when installing the sensor to reduce the risk of injury or equipment damage:

- In-Sight Micro vision systems are intended to be supplied by a standard Class 2 Power over Ethernet (PoE) power supply. Any other voltage creates a risk of fire or shock and can damage the sensor components.
- To reduce the risk of damage or malfunction due to over-voltage, line noise, electrostatic discharge (ESD), power surges, or other irregularities in the power supply, route all cables and wires away from high-voltage power sources.
- Do not install In-Sight sensors where they are directly exposed to environmental hazards such as excessive heat, dust, moisture, humidity, impact, vibration, corrosive substances, flammable substances, or static electricity.
- Do not expose the CCD to laser light; CCDs can be damaged by direct, or reflected, laser light. If your application requires the use of laser light that may strike the CCD, a lens filter at the corresponding laser's wavelength is recommended. Contact your local integrator or application engineer for suggestions.
- The In-Sight sensor does not contain user-serviceable parts. Do not make electrical or mechanical modifications to In-Sight sensor components. Unauthorized modifications may void your warranty.
- Changes or modifications not expressly approved by the party responsible for regulatory compliance could void the user’s authority to operate the equipment.

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In-Sight Micro Vision System Overview

In-Sight® Micro vision systems are compact, network-ready machine vision sensors for automated inspection, measurement, identification and robot guidance applications on the factory floor. For a list of all available sensors, refer to Table 1-1 on page 2.

All models are configured remotely over a network using an intuitive user interface. This interface allows remote monitoring of the sensor's operation during runtime. These sensors may also be controlled remotely to change settings and retrieve results.

This manual describes how to install the In-Sight Micro vision system.

In-Sight Support

Many information resources are available to assist you in using the sensor:

- *In-Sight®Explorer Help*, an online HTML Help file provided on the In-Sight CD-ROM (for In-Sight Explorer software).
- In-Sight computer-based tutorials provided on CD-ROM with selected In-Sight starter accessories kits.
- The In-Sight online support: http://cognexsensors.com/In-Sight.

In-Sight Micro Vision System Standard Components

In-Sight Micro vision systems are shipped with the standard components listed in Table 1-1.

Table 1-1: In-Sight Micro Vision System Standard Components

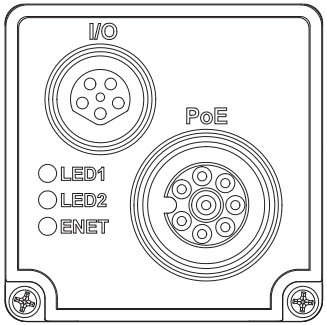
Component	Description
Vision Sensor: 1020/1050: P/N or Type 821-0002-1R 1100/1110: P/N or Type 821-0002-1R 1400/1410: P/N or Type 821-0002-1R 1403/1413: P/N or Type 821-0003-1R	Provides image acquisition, vision processing, job storage, Ethernet connectivity and discrete I/O.
Mounting Screw Kit	Includes M3 screws for mounting the sensor (quantity 4).
Mounting Block	Optional block for securing the sensor to a mounting surface.
Extension Ring	A 5mm extension ring (for use with C-mount lenses).

Note: The standard components do not include a Power over Ethernet (PoE) cable or I/O cable; these cables must be purchased separately.

Connecting the In-Sight Micro Vision System

This section describes the connection of the sensor to its standard and optional components. For a complete list of options and accessories, contact your Cognex sales representative.

Table 2-1: Sensor Connectors and Indicators



Connector/Indicator	Function
I/O Connector	Connects the I/O cable, which provides connections to the acquisition trigger input and high-speed outputs. Refer to Table 3-5 on page 19.
PoE Connector	Connects the sensor to a network. The PoE connector provides power to the sensor and the Ethernet connection to external network devices. Refer to Table 3-4 on page 18.
LED1	Green when active. User-configurable using Discrete Output Line 4 (Line 10 when using the CIO-WENET (750-341) Ethernet I/O Expansion Module).
LED2	Red when active. User-configurable using Discrete Output Line 5 (Line 11 when using the CIO-WENET (750-341) Ethernet I/O Expansion Module).
ENET	100-BaseT: Red when the sensor is receiving power during startup, momentarily switches to green when a network connection is established, and then blinks green when network traffic is detected. If a network connection cannot be established, the LED remains red. 10-BaseT: Red when the sensor is receiving power during startup, momentarily switches to green when a network connection is established. The LED is solid green with red blinking when network traffic is detected. If a network connection cannot be established, the LED remains red.

Install the Lens

Installing a lens allows you to see the sensor acquire live video images. The exact lens focal length needed depends on the working distance and the field of view required for your machine vision application.

1. Attach a CS-Mount or C-Mount (with 5mm extension ring) lens to the sensor (Figure 2-1).

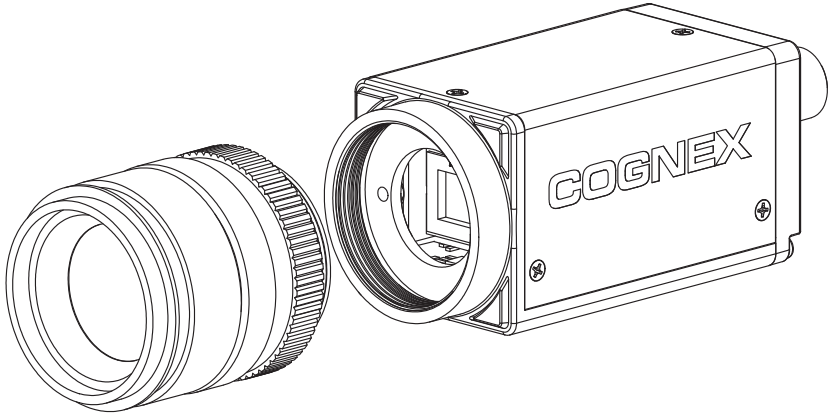


Figure 2-1: Install the Lens

Connect the I/O Cable (Optional)

The I/O connector supplies connections for the acquisition trigger and high speed inputs and outputs.

Notes:	• The In-Sight sensor standard components do not include an I/O cable; this cable must be purchased separately. • Refer to the *In-Sight® Explorer Help* file for details on configuring the discrete input and output lines. • Unused bare wires can be clipped short or tied back using a tie made of non-conductive material.

1. Attach the M8 connector of the I/O cable to the sensor's I/O connector.
2. Connect the trigger and high speed I/O wires to an appropriate device (for example, a PLC, trigger sensor, strobe light, etc.).

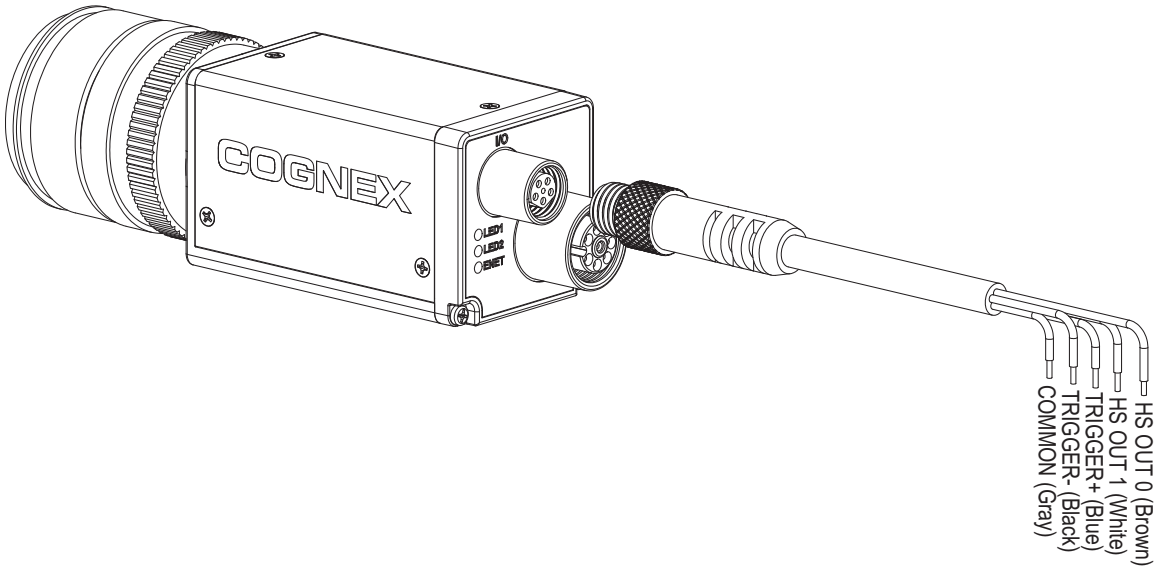


Figure 2-2: Connect the I/O Cable

Connect the PoE Cable

The PoE connector provides the Ethernet connection for network communications and supplies power to the sensor.

Note:	The In-Sight sensor standard components do not include a PoE cable; this cable must be purchased separately.

1. Attach the M12 connector of the PoE cable to the sensor's PoE connector.

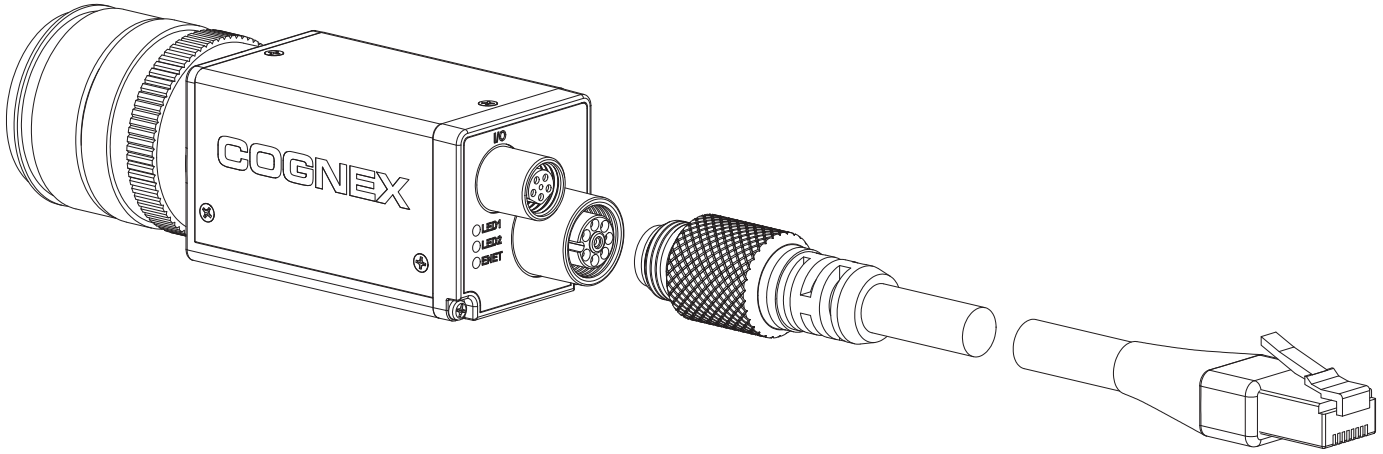


Figure 2-3: Connect the PoE Cable

Option 1: Connecting to a Local PC, an Existing Network or an Ethernet I/O Expansion Module

In this configuration, the PoE injector supplies power to the sensor.

1. Connect the RJ-45 connector of the PoE cable to the PoE injector's POE OUT port.
2. Connect an RJ-45 cable from the PoE injector's ETH IN port to the PC, switch/router or Ethernet I/O expansion module, as applicable.
3. Connect the 24VDC power supply to the PoE injector.
4. Supply power to the 24VDC power supply.

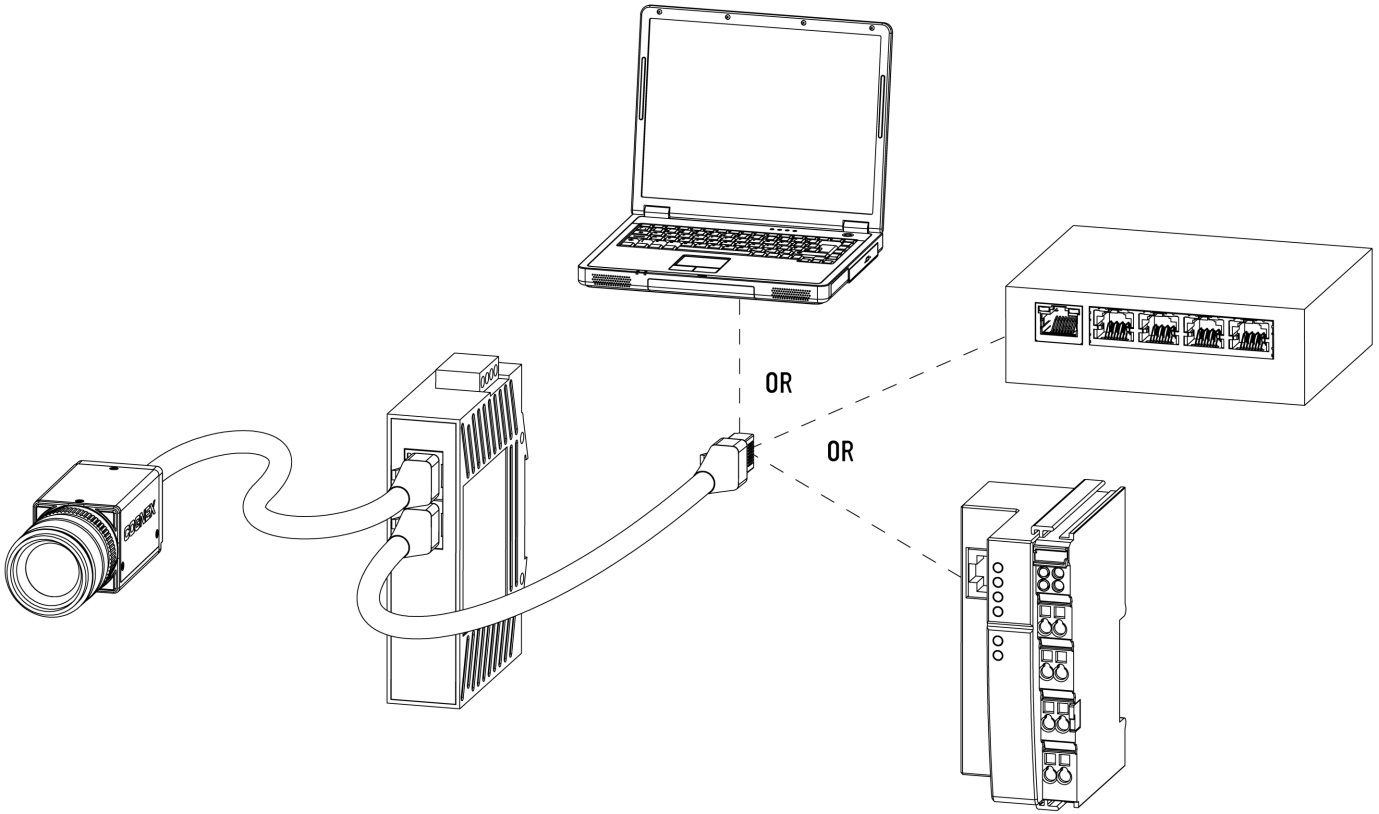


Figure 2-4: Connected to a Local PC, an Existing Network or an Ethernet I/O Expansion Module

Option 2: Connecting to a Cognex VisionView™

In this configuration, the VisionView supplies power to the sensor.

1. Connect the RJ-45 connector of the PoE cable to one of the VisionView Vision Sensor ports.
2. Connect the 24VDC power supply to the VisionView.
3. Supply power to the VisionView.

Note:	For more information, refer to the *VisionView User Manual*.

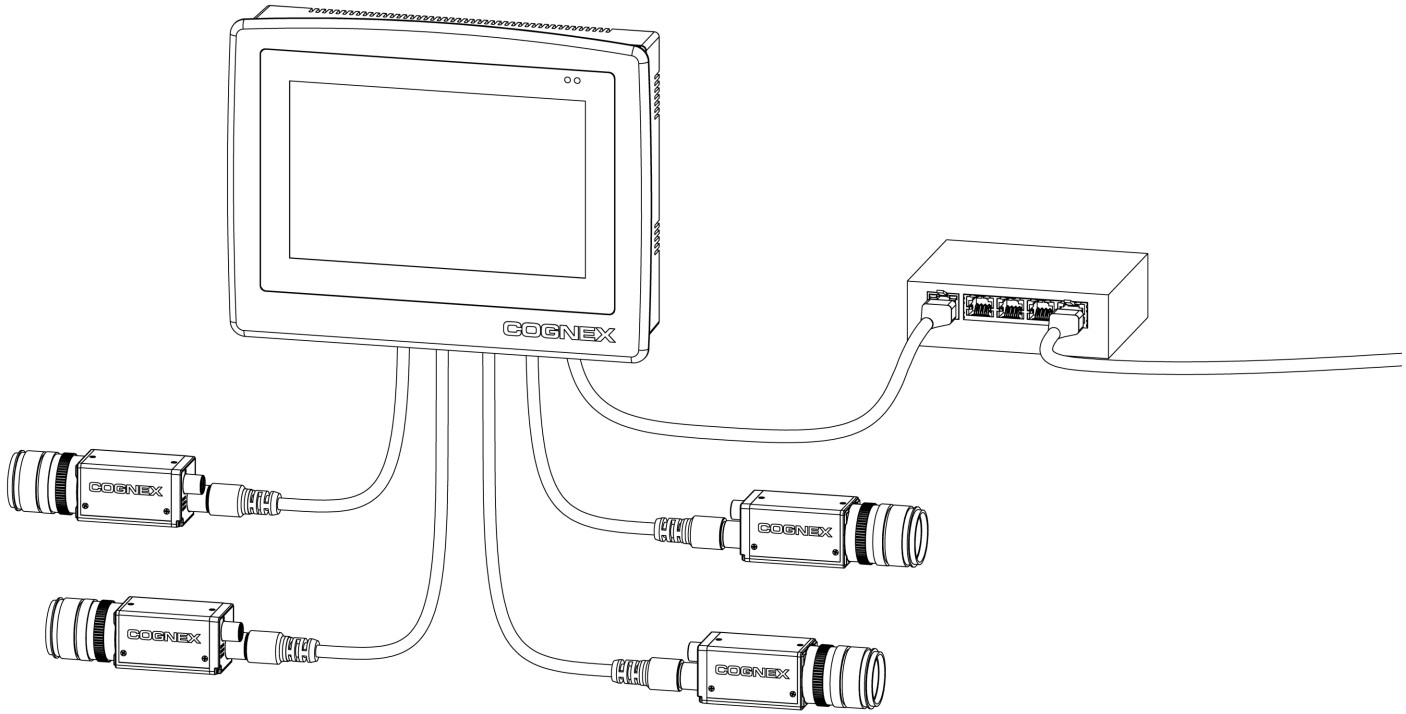


Figure 2-5: Connected to VisionView

General Specifications

The following sections list general specifications for the In-Sight Micro vision systems.

Table 3-1: In-Sight Micro Vision System Specifications

Specification		In-Sight 1020/1050	In-Sight 1100/1110	In-Sight 1400/1410	In-Sight 1403/1413
Performance Class		→			
Minimum Firmware Requirement		In-Sight version 4.1.0			
Memory	**Job/Program**	64MB non-volatile flash memory; unlimited storage via remote network device.			
	Image Processing	128MB			
Image	**Sensor**	1/3-inch CCD			1/1.8-inch CCD
	Sensor Properties	5.92mm diagonal, 7.4 x 7.4µm sq. pixels			8.8mm diagonal, 4.4 x 4.4µm sq. pixels
	Resolution (pixels)	640 x 480			1600 x 1200
	Electronic Shutter Speed	16µs to 1000ms			27µs to 1000ms
	Acquisition[1]	Rapid reset, progressive scan, full-frame integration.			
		256 grey levels (8 bits/pixel)			
		Gain/Offset controlled by software.			
		60 full frames per second			14 full frames per second
	Lens Type	CS-mount and C-mount (with 5mm extension, included).			
	Image Repeatability[2]	±0.127mm (0.005in), (both x and y) from lens C-mount axis to center of imager.			
I/O	**Trigger**	1 opto-isolated, acquisition trigger input.			
		Remote software commands via Ethernet.			
	Discrete Inputs	Eight inputs available when using the optional CIO-WENET (750-341) Ethernet I/O expansion module.			
	Discrete Outputs	2 built-in, high-speed outputs.			
		Eight outputs available when using the optional CIO-WENET (750-341) Ethernet I/O expansion module.			
	Status LEDs	Network, 2 user configurable.			
Communications	**Network**	1 Ethernet port, 10/100 BaseT MIDI-X. Supports DHCP (factory default), static and link-local IP address configuration.			

Table 3-1: In-Sight Micro Vision System Specifications (Cont.)

Specification		In-Sight 1020/1050	In-Sight 1100/1110	In-Sight 1400/1410	In-Sight 1403/1413
Power	**Class**	Class 2 Power over Ethernet (PoE) device.			
	Type	A and B.			
Mechanical	**Material**	Die-cast zinc housing.			
	Finish	Painted.			
	Mounting	Four M3 threaded mounting holes (1/4 - 20 and M6 mounting holes also available on mounting block).			
	Dimensions	30mm (1.18in) x 30mm (1.18in) x 60mm (2.36in)			
	Weight	121g (4.27oz.) without mounting block. 146g (5.15oz.) with mounting block.			
Environmental	**Temperature**	0°C (32°F) to 45°C (113°F) (Operating), -30°C (-22°F) to 80°C (176°F) (Storage)			
	Humidity	90%, non-condensing (Operating and Storage)			
	Protection	IP51 with cables and lens attached.			
	Shock	80 G shock with 50 gram lens attached per IEC 68-2-27.			
	Vibration	10 G from 10-500 Hz with 50 gram lens attached per IEC 68-2-6.			
Regulatory Compliance		CE, FCC, TUV SUD NRTL, RoHS			

1. Maximum frames per second is job-dependent and based on the minimum exposure for a full image frame capture.
2. Expected repeatability between sensors. This equates to ~ ±17 pixels on a 640 x 480 resolution sensor and ~ ±29 pixels on a 1600 x 1200 resolution sensor.

I/O Specifications

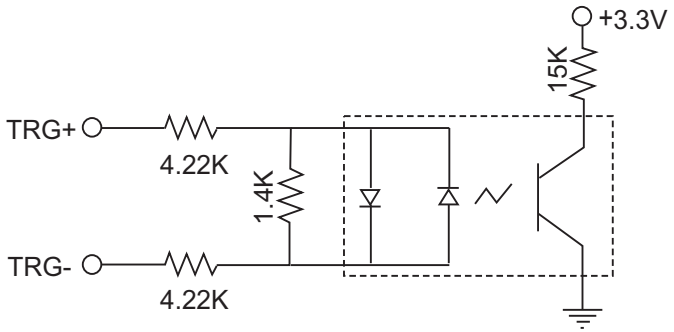
Cable and connector specifications and connection examples for the Acquisition Trigger input and the high-speed outputs are provided in the following sections.

Acquisition Trigger Input

Table 3-2: Acquisition Trigger Input Specifications

Specification		Description
Voltage	ON	20 to 28V (24V nominal)
	OFF	0 to 3V (12V nominal threshold)
Current	ON	2.2 to 3.3 mA
	OFF	<308µA
	Resistance	~9,000 Ohms
Delay	In-Sight Micro 1020, 1050, 1100, 1110, 1400, & 1410	62µs maximum latency between leading edge of trigger and start of acquisition. Input pulse should be minimum of 1 ms wide.
	In-Sight Micro 1403 & 1413	80µs maximum latency between leading edge of trigger and start of acquisition. Input pulse should be minimum of 1 ms wide.

The acquisition trigger input on the sensor is opto-isolated. To trigger from an NPN (pull-down) type photo-detector or PLC output, connect pin 2 (TRG+) to +24V and connect pin 3 (TRG-) to the output of the detector. When the output turns ON, it pulls TRG- down to 0V, turning the opto-coupler ON. To trigger from a PNP (pull-up) photo-detector or PLC output, connect pin 2 (TRG+) to the output of the detector and connect pin 3 (TRG-) to 0V. When the output turns ON, it pulls TRG+ up to 24V, turning the opto-coupler ON.



28V Max. Across input pins - Transition approx. 12V (Min).

Figure 3-1: Acquisition Trigger Input Schematic

High-Speed Outputs

The In-Sight sensor features two built-in, high-speed outputs.

Table 3-3: High-Speed Output Specifications

Specification	Description
Voltage	28V maximum through external load.
Current	100mA maximum sink current.
	OFF state leakage current 100µA maximum.
	External load resistance 240 Ohms to 10K Ohms.
	Each line rated at a maximum 100mA, protected against over-current, short circuit and transients from switching inductive loads. High current inductive loads require external protection diode.

The high-speed outputs can be used as either NPN (pull-down) or PNP (pull-up) lines. For NPN lines, the external load should be connected between the output and the positive supply voltage (<28V). The outputs pull down to less than 3V when ON, which causes current to flow through the load. When the outputs are OFF, no current flows through the load.

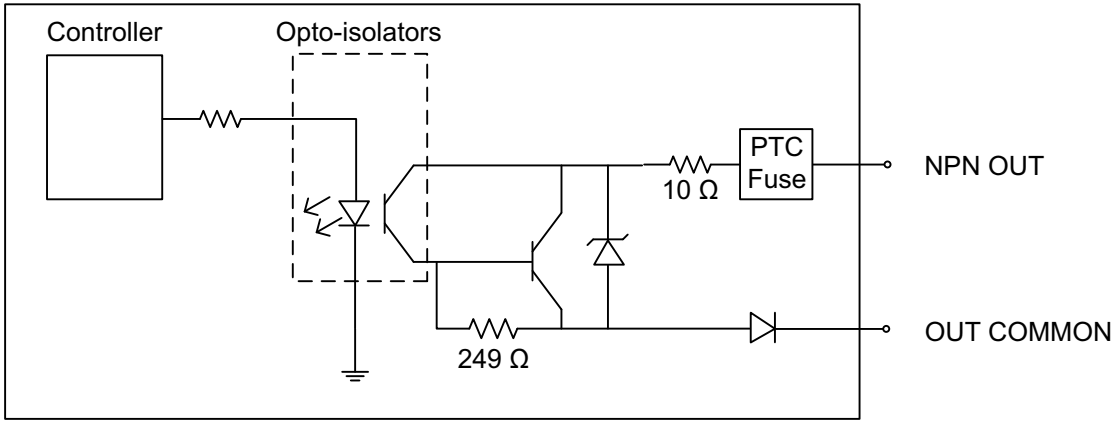


Figure 3-2: NPN High-Speed Output Schematic

For PNP lines, the external load should be connected between the output and the negative supply voltage (0V). When connected to a 24VDC power supply, the outputs pull up to greater than 21V when ON, and current flows through the load. When the outputs are OFF, no current flows through the load.

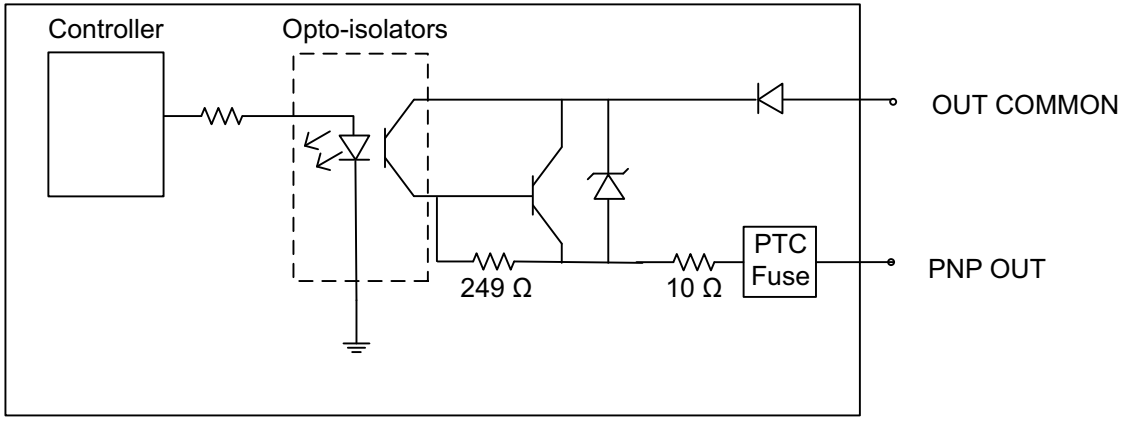


Figure 3-3: PNP High-Speed Output Schematic

Example 1

To connect the high-speed outputs to a relay, LED or similar load, connect the negative side of the load to the output and the positive side to +24V. When the output switches on, the negative side of the load is pulled down to less than 3V, and 24V appears across the load. Use a protection diode for a large inductive load, with the anode connected to the output and the cathode connected to +24V.

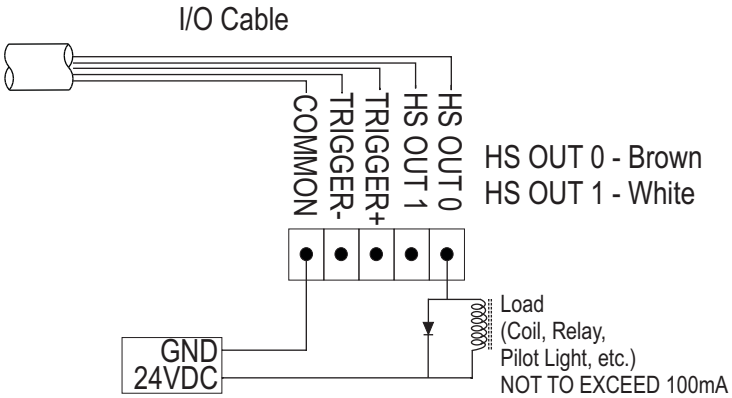


Figure 3-4: High-Speed Output Connection Example 1

Example 2

To connect to an NPN-compatible PLC input, connect Output 0 or Output 1 directly to the PLC input. When enabled, the output pulls the PLC input down to less than 3V.

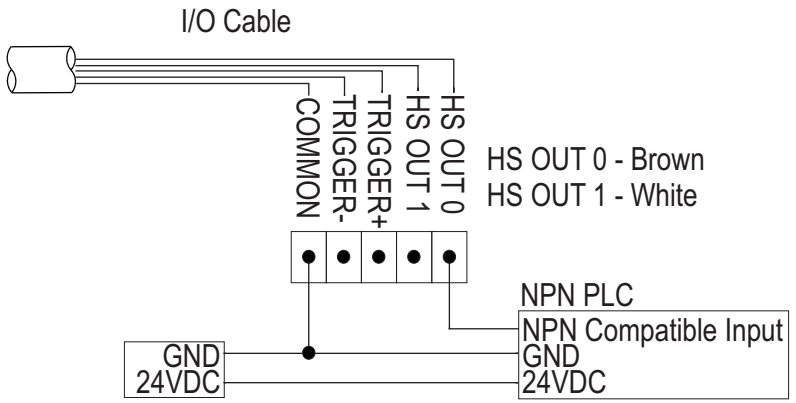


Figure 3-5: High-Speed Output Connection Example 2

Example 3

To connect to a PNP-compatible PLC input, connect Output 0 or Output 1 directly to the PLC input. When enabled, the output pulls the PLC input up to greater than 21V.

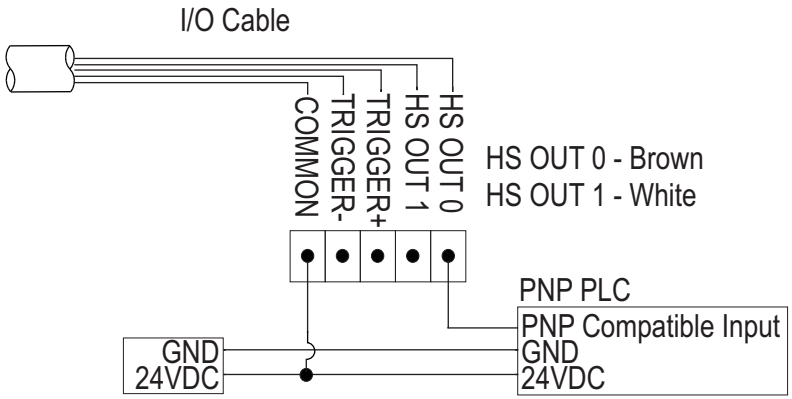
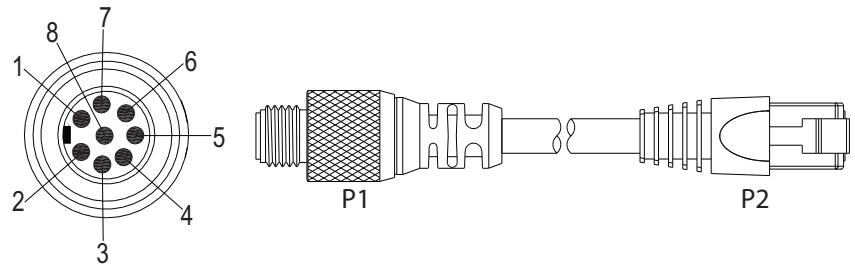


Figure 3-6: High-Speed Output Connection Example 3

PoE Cable Specifications

The PoE cable provides the Ethernet connection for network communications and supplies power to the sensor.

Table 3-4: PoE Cable Pin-Out



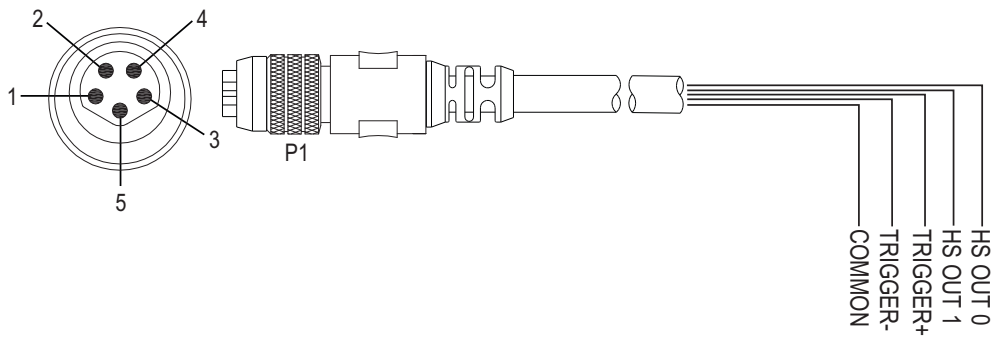
Signal Name	P1 Pin#	P2 Pin#	Wire Color
TPO+/+48V (Mode A)	6	1	White/Orange
TPO-/+48V (Mode A)	4	2	Orange
TPI+/+48V RTN (Mode A)	5	3	White/Green
+48V (Mode B)	7	4	Blue
+48V (Mode B)	1	5	White/Blue
TPI-/+48V RTN (Mode A)	8	6	Green
+48V RTN (Mode B)	2	7	White/Brown
+48V RTN (Mode B)	3	8	Brown

Note: The sensor's standard components do not include a PoE cable; it must be purchased separately.

I/O Cable Specifications

The I/O cable provides access to trigger and high-speed outputs.

Table 3-5: I/O Cable Pin-Out



Pin#	Signal Name	Wire Color
1	HS OUT 0	Brown
2	HS OUT 1	White
3	TRIGGER+	Blue
4	TRIGGER-	Black
5	COMMON	Gray

Notes:

- The sensor's standard components do not include an I/O cable; it must be purchased separately.
- Unused bare wires can be clipped short or tied back using a tie made of non-conductive material.

In-Sight Dimensional Drawings

Note: All dimensions are in millimeters [inches].

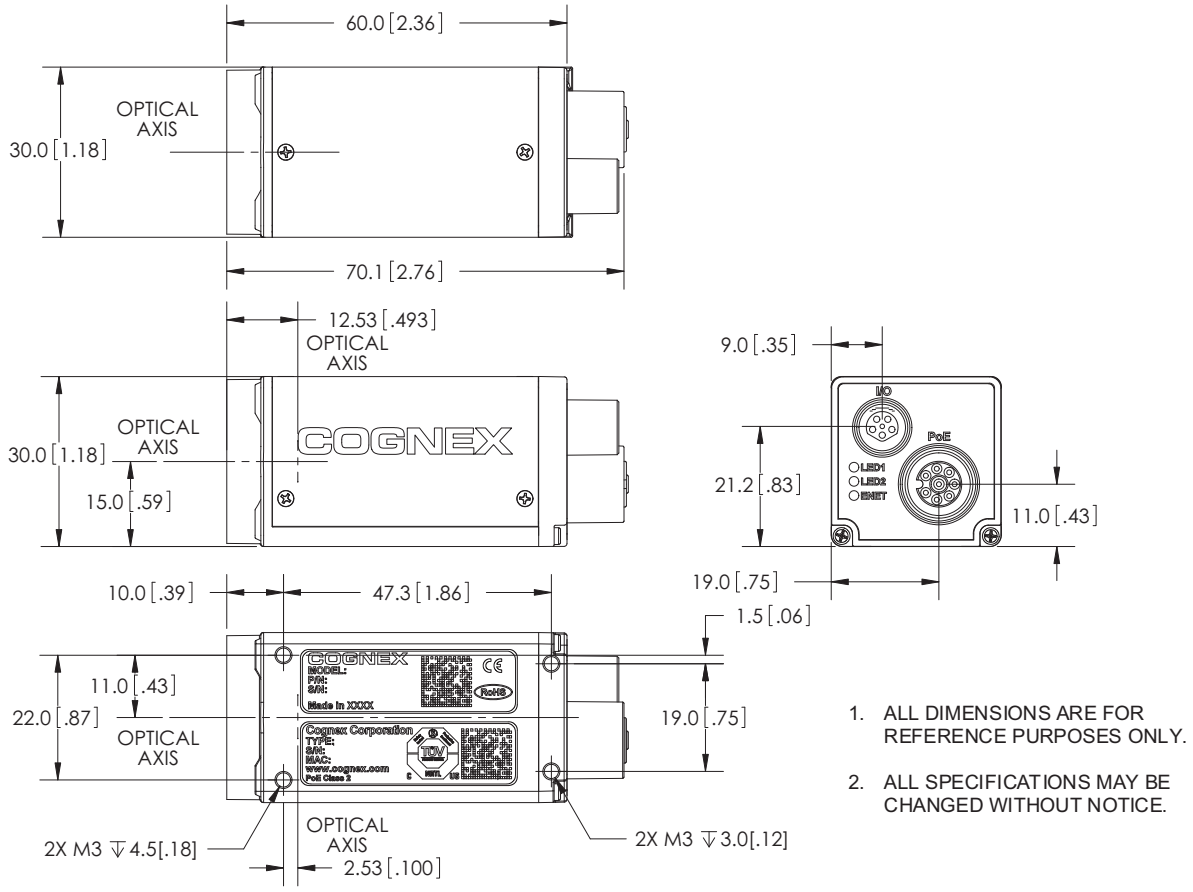
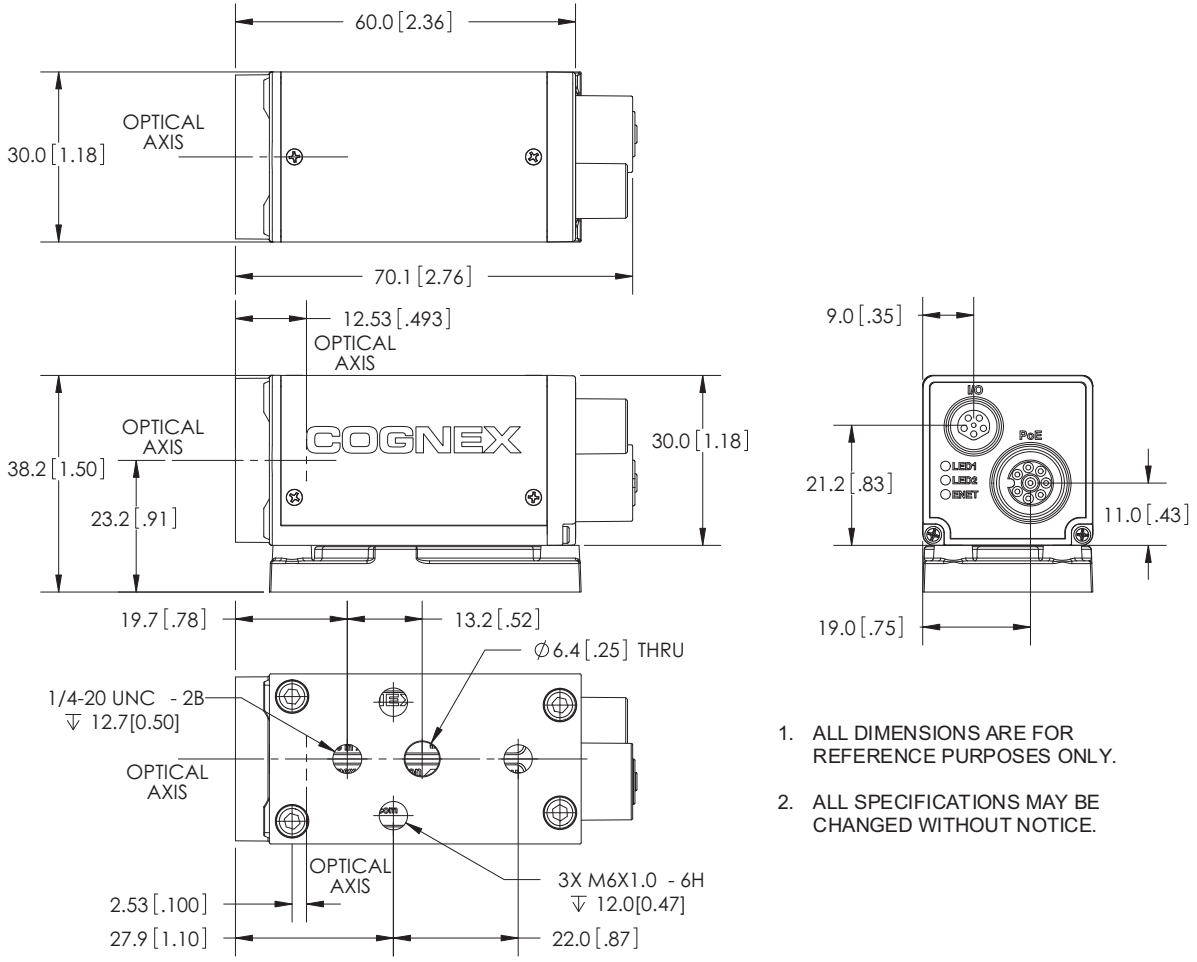


Figure 3-7: In-Sight Micro Vision System Dimensions

In-Sight Mount Dimensions

Note:	All dimensions are in millimeters [inches]. Refer to Appendix A for installation instructions.



1. ALL DIMENSIONS ARE FOR REFERENCE PURPOSES ONLY.
2. ALL SPECIFICATIONS MAY BE CHANGED WITHOUT NOTICE.

Figure 3-8: In-Sight Micro Vision System Dimensions (with Mounting Block)

Installing the Mounting Block

The sensor's standard components include a mounting block to secure the sensor to a mounting surface.

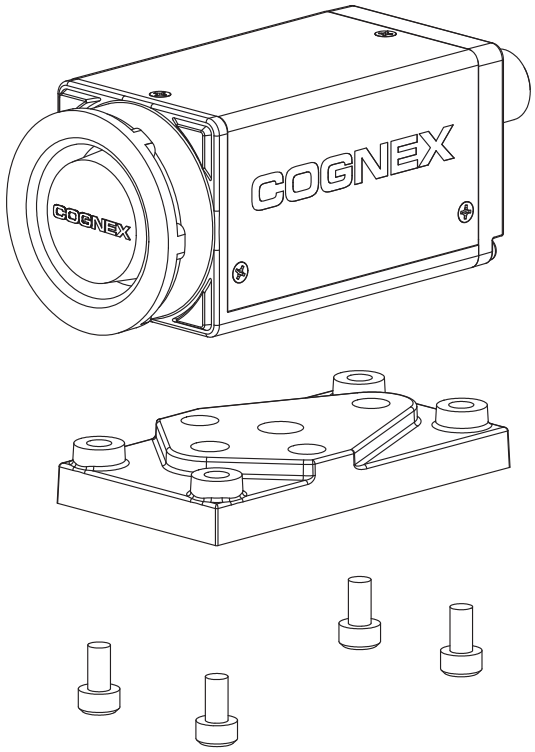


Figure 4-1: Mounting Block Installation Diagram

1. Align the mounting block with the mounting holes on the sensor.
2. Insert the M3x6 (quantity 4) screws into the mounting holes and tighten the screws (maximum torque 8 ft.-lb.) using a 2.5mm Allen wrench.
3. Connect the I/O cable (optional) and PoE cable to the sensor.

Cleaning/Maintenance

Cleaning the Sensor Housing

To clean the outside of the sensor housing, use a small amount of mild detergent cleaner or isopropyl alcohol on a cleaning cloth. Do not pour the cleaner directly onto the sensor housing.

Note:	Do not attempt to clean any In-Sight product with harsh or corrosive solvents, including Lye, methyl ethyl ketone (MEK) or gasoline.

Cleaning the CCD Window

To remove dust from the outside of the CCD window, use a pressurized air duster. The air must be free of oil, moisture or other contaminants that could remain on the glass and possibly degrade the image. Do not touch the glass window. If oil/smudges still remain, clean the window with a cotton bud using ethyl alcohol. Do not pour the alcohol directly on the window.

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